

Diabetes in pregnancy



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Diabetes in pregnancy

- Pre-existing diabetes
 - ❑ IDDM (Type 1)
 - ❑ NIDDM (Type 2)
- GDM
 - ❑ True GDM (arises during pregnancy)
 - ❑ preexisting but previously unrecognized diabetes (diagnosed for the 1st time during pregnancy)

Epidemiology

5% of the pregnant women have either pre-existing diabetes or gestational diabetes :

➤ 87.5% have gestational diabetes

➤ 7.5% have type 1 diabetes

➤ 5% have type 2 diabetes.

- The prevalence of gestational diabetes, has increased in recent years as a result of higher rates of obesity in the general population and more pregnancies in older women.

Effect of preexisting DM on pregnancy Maternal complications

- Increased insulin requirement
- Hypoglycemia
- DKA (more with type 1 diabetes)
- Deterioration in diabetic retinopathy
- increase risk of pre-eclampsia
- increase risk of infection eg vaginal candidiasis, UTI, endometrial or wound infection
- increase LSCS rate

Fetal complications

- Miscarriage (risk increases with increase of the duration of the disease and the poor glycemic control)
- Birth defects (periconceptional glycemic control is the main determinant ,the incidence is about 22% if the HbA1c >8.5%)

Two-thirds involve the cardiovascular and central nervous systems.

Neural tube defects occur 13-20 times more frequently

Most common anomaly is :

Pathognomic anomaly is :

- Growth restriction :

more in women with preexisting type 1 diabetes

The most important predictor is underlying maternal vascular disease(Specifically, patients with retinal or renal vasculopathies and/or chronic hypertension)

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- Increased neonatal and perinatal mortality
 - Macrosomia
 - IUFD
 - Polyhydramnios
 - Shoulder dystocia
 - Neonatal hypoglycemia
 - Polycythemia
 - Jaundice

Pre-conception Counselling

- **Allows for optimization of diabetic control prior to conception, and assessment of the presence of complications like hypertension, nephropathy, and retinopathy**
- **Should counsel that good control and lower HBA1c lower the risk of congenital abnormalities and improve outcome**
- **If necessary, proliferative retinopathy may be treated with photocoagulation prior to conception**
- **Contraindications to pregnancy only :ischemic heart dx, untreated proliferative retinopathy, severe renal impairment(creatinine>250 mmol/L)**

Target blood glucose and HbA1c levels before pregnancy

- HbA1c should be kept below 6.5 %
any reduction toward this target will reduce the risk of congenital malformations
- if HbA1c level is above 86 mmol/mol (10%) advise strongly against pregnancy until their HbA1c level is lower, because of the associated risks

Dietary supplements and body weight

- folic acid (5 mg/day) until 12 weeks of gestation to reduce the risk of having a baby with a neural tube defect.
- For women with diabetes who are planning a pregnancy and who have a body mass index (BMI) above 27 kg/m² , advice for weight loss

Antenatal care for women with preexisting DM

Organization of antenatal care

Joint diabetes and antenatal clinics should be in contact with women with diabetes every 1 to 2 weeks throughout pregnancy, for blood glucose control assessment.

At each appointment, offer pregnant women with diabetes ongoing opportunities for information and education.

Monitoring blood glucose

- ❑ for pregnant women with type 1 diabetes or type 2 diabetes or gestational diabetes who are on a multiple daily insulin injections :

advise to test fasting, pre-meal, 1-hour post-meal and bedtime blood glucose levels daily

- ❑ advise pregnant women with type 2 diabetes or gestational diabetes to test their fasting and 1-hour post-meal blood glucose levels daily if they are:
 - ✓ managing their diabetes with diet and exercise changes alone or
 - ✓ taking oral therapy (with or without diet and exercise changes) or
 - ✓ single-dose intermediate-acting or long-acting insulin.

❑ Preventing pre-eclampsia :

For pregnant women with diabetes type 1 & type 2

75–150 mg of aspirin daily from 12 weeks until the birth is advised

❑ Detecting congenital malformations :

an ultrasound scan at 18-21 weeks to detect fetal structural, including examination of the fetal heart (4 chambers, outflow tracts and 3 vessels) should be offered

Renal assessment

- At first contact during the pregnancy for women with pre-existing diabetes, if they have not had one in the last 3 months.

- Consider referring pregnant women with diabetes to a nephrologist if:
 - their serum creatinine is 120 micromol/litre or more or
 - the urinary albumin:creatinine ratio is greater than 30 mg/mmol or
 - total protein excretion exceeds 0.5 g/day.

- Consider thromboprophylaxis for pregnant women with nephrotic range proteinuria above 5 g/day (albumin:creatinine ratio greater than 220 mg/ mmol).

Retinal assessment

- for women with pre-existing diabetes offer retinal assessment after the first antenatal clinic appointment (unless they have had a retinal assessment in the last 3 months)
- if they have diabetic retinopathy, offer an additional retinal assessment at 16 to 20 weeks and another retinal assessment at 28 weeks.
- Diabetic retinopathy should not be considered a contraindication to vaginal birth.

Treatment goal

- Achieve maternal near normoglycemic level to prevent adverse perinatal outcomes
- Target blood glucose:
fasting < 5mmol/L
2 hr < 7 mmol/L

- Options :

- Life style modification

- Oral hypoglycemic agents :

- 2nd generation sulphonylurea (glyburide)

- biguanides (metformin)

- Insulin

Gestational diabetes mellitus (GDM)

glucose intolerance of variable degree with onset or first recognition during pregnancy.

Maternal-Fetal Metabolism in Normal Pregnancy

- each meal sets in motion a complex series of hormonal actions, including a rise in blood glucose and the secondary secretion of pancreatic insulin, glucagon, somatomedins, and adrenal catecholamines to ensure that an ample, but not excessive, supply of glucose is available to the mother and fetus.
- Levels of placental steroid and peptide hormones (eg, estrogens, progesterone, and chorionic somatomammotropin) rise linearly throughout the second and third trimesters

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- Because these hormones confer increasing tissue insulin resistance as their levels rise, the demand for increased insulin secretion with feeding escalates progressively during pregnancy.
 - By the third trimester, 24-hour mean insulin levels are 50% higher than in the nonpregnant state.
 - Pregnant women tend to develop hypoglycemia between meals and during sleep which becomes increasingly marked as pregnancy progresses

Maternal-Fetal Metabolism in Diabetes

- If the maternal pancreatic insulin response is inadequate ;
maternal and then, fetal hyperglycemia >>
recurrent postprandial hyperglycemic episodes
>>Fetal hyperinsulinemia >> excess nutrient
storage, resulting in macrosomia.
- The energy expenditure associated with the
conversion of excess glucose into fat causes
depletion in fetal oxygen levels.

These episodes of fetal hypoxia are accompanied by surges in adrenal catecholamines, which, in turn, cause :

- hypertension, cardiac remodeling and hypertrophy
- stimulation of erythropoietin, red cell hyperplasia, and increased hematocrit that lead to vascular sludging, poor circulation, and postnatal hyperbilirubinemia.

Maternal complications

Increase risk of hypertensive disorders

Increase risk of caesarean and instrumental deliveries

Increased Risk (40-60%) of developing type 2 DM within 10-15 yr.

Fetal morbidity

- Fetal macrosomia :

Fetal weight above the 90th centile for the gestational age with unique central deposition of subcutaneous fat in the abdominal and interscapular areas.

Maternal obesity has a strong and independent effect .

Birth weight is largely determined by maternal factors other than hyperglycemia, with the most significant influences being gestational age at delivery, maternal prepregnancy body mass index (BMI), maternal height, pregnancy weight gain, the presence of hypertension, and cigarette smoking.

- Birth injuries :

shoulder dystocia and brachial plexus trauma, macrosomic fetuses are at the highest risk.

- IUFD

- perinatal mortality and postnatal adaptation problems (such as Respiratory distress syndrome , hypoglycaemia , hypocalcemia and polycythemia ,hyperbilirubinemia and jaundice)

- Children are at risk of type 2 DM and obesity in life

Risk factors for gestational diabetes :

- BMI above 30 kg/m²
 - previous macrosomic baby weighing 4.5 kg or more
 - previous gestational diabetes
 - family history of diabetes (first-degree relative with diabetes)
 - an ethnicity with a high prevalence of diabetes.
- ✓ Offer women with any of these risk factors testing for gestational diabetes

Testing

- 75-g 2-hour oral glucose tolerance test (OGTT) in women with any risk factor at 24 to 28 weeks

(at this point in gestation the diabetogenic effect of pregnancy is manifest and there is sufficient time remaining in pregnancy for therapy to exert its)

- For women who have had gestational diabetes in a previous pregnancy, offer:

- early self-monitoring of blood glucose

OR

- a 75-g 2-hour OGTT as soon as possible after booking (whether in the first or second trimester), and a further 75-g 2-hour OGTT at 24 to 28 weeks if the results of the first OGTT are normal .

OGTT

- the patient should be instructed to eat a normal carbohydrate diet of at least 150 grams of carbohydrates for at least 3 days prior to the test. On the day of the test typically a patient must arrive in a fasting state (at least 8 hours and not more than 12 hours)
- A fasting sample is taken either by phlebotomy or intravenous access to establish a baseline glucose level.
- Then, the patient will drink the glucose (75 grams)Patients are asked to fast throughout the test except for drinking the glucose.
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- Samples are then taken at 60 and 120 minutes post-consumption of glucose.
- Throughout the test, patients should remain inactive, and excess hydration with water should be discouraged as these can impact the results of the test.

Interpretation

according to the international association of diabetes and pregnancy study groups (IADPSG)

Test	Threshold
Fasting plasma glucose	≥ 92 mg/dl
1-hour plasma glucose	≥ 180 mg/dl
2-hour plasma glucose	≥ 153 mg/dl

Gestational diabetes is diagnosed if one or more of these values is met or exceeded



Interventions

- Refer all women with gestational diabetes to a dietitian
- Advise women with gestational diabetes to eat a healthy diet during pregnancy, and to switch from high to low glycaemic index food.
- avoid single large meals and foods with a large percentage of simple carbohydrates
- Encourage high fiber diet
- Frequent small snacks may be needed between meals
- Avoid starvation

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- Advise women with gestational diabetes to exercise regularly (for example, walking for 30 minutes after a meal).
 - If blood glucose targets are not met with diet and exercise changes within 1 to 2 weeks, offer metformin

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- If metformin is contraindicated or unacceptable to the woman, offer insulin.
 - If blood glucose targets are not met with diet and exercise changes plus metformin, offer insulin as well
 - For women with gestational diabetes who have a fasting plasma glucose level of 7.0 mmol/litre or above at diagnosis, offer:
immediate treatment with insulin, with or without metformin and
diet and exercise changes

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- For women with gestational diabetes who have a fasting plasma glucose level of between 6.0 and 6.9 mmol/litre and complications such as macrosomia or hydramnios, consider:

immediate treatment with insulin, with or without metformin and diet and exercise changes.

Monitoring fetal growth and wellbeing

- Offer pregnant women with diabetes ultrasound monitoring of fetal growth and amniotic fluid volume every 4 weeks from 28 to 36 weeks.
- Routine monitoring of fetal wellbeing before 38 weeks is not recommended unless there is a risk of fetal growth restriction.
- This includes methods such as fetal umbilical artery doppler recording, fetal heart rate recording and biophysical profile testing.

Timing and mode of birth

- ❑ pregnant women with type 1 or type 2 diabetes and no other complications :
an elective birth by induced labour or (if indicated) caesarean section, between 37 weeks and 38 weeks plus 6 days of pregnancy
- ❑ for women with type 1 or type 2 diabetes who have metabolic or other maternal or fetal complications :
elective birth before 37 weeks

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- women with gestational diabetes to give birth :

Offer elective birth by induced labour or (if indicated) by caesarean section no later than 40 weeks plus 6 days.

for women with gestational diabetes who have maternal or fetal complications :

Consider elective birth before 40 weeks plus 6 days

Blood glucose control during labour and birth

- capillary plasma glucose every hour
- Should be maintained between 4 mmol/litre and 7 mmol/ litre
- intravenous dextrose and insulin infusion may be considered

Postnatal care

Blood glucose control, medicines

- Women with insulin-treated pre-existing diabetes should reduce their insulin immediately after birth and monitor their blood glucose levels to find the appropriate dose
- Women with pre-existing type 2 diabetes who are breastfeeding can resume or continue metformin immediately after birth, but should avoid other oral blood glucose-lowering therapy while breastfeeding
- Women who have been diagnosed with gestational diabetes should stop blood glucose-lowering therapy immediately after birth

follow-up

- fasting plasma glucose test 6 to 13 weeks after the birth to exclude diabetes
- after 13 weeks :
 - fasting plasma glucose test if this has not been done earlier
 - HbA1c test
 - 75-g 2-hour OGTT (not routinely)

➤ fasting plasma glucose level below 6.0 mmol/litre :

- Continue to follow the lifestyle advise (weight control, diet and exercise)
- Annual HbA1c test to check that their blood glucose levels are normal

➤ fasting plasma glucose level between 6.0 mmol/litre and 6.9 mmol/litre :

high risk of developing type 2 diabetes

Should be advised for following measures to prevent type 2 diabetes

➤ Advise women with a fasting plasma glucose level of 7.0 mmol/litre or above that they are likely to have type 2 diabetes, and offer them a test to confirm